MISB MOTION IMAGERY STANDARDS BOARD	MISB ST 1801
STANDARD	
Surface Profiles	**23 October 2019**

1 Scope

This standard defines Motion Imagery Surface Minimum Metadata Profiles, or Surface Profiles, which enable the capabilities of Surface-based Situational Awareness, Photogrammetric Object Tracking, Discovery & Retrieval, and Cross-Domain Dissemination.

2 References

[1] MISB ST 1903 Motion Imagery Metadata (MIMD): Model, Oct 2019.
[2] MISB MISP-2020.1: Motion Imagery Handbook, Oct 2019.
[3] MISB ST 1905 Motion Imagery Metadata (MIMD) Model: Platforms, Oct 2019.
[4] MISB ST 1907 Motion Imagery Metadata (MIMD) Model: Payloads, Oct 2019.
[5] MISB ST 1908 Motion Imagery Metadata (MIMD) Model: Imager System, Oct 2019.
[6] MISB ST 1906 Motion Imagery Metadata (MIMD): Staging System, Oct 2019.
[7] MISB ST 1204.2 Motion Imagery Identification System (MIIS) Core Identifier, Jun 2019.
[8] MISB ST 1904 Motion Imagery Metadata (MIMD): Base Attributes, Oct 2019.

3 Revision History

Revision	Date	Summary of Changes
ST 1801	10/23/2019	• Initial release

4 Acronyms

LRF	Laser Range Finder
MIMD	Motion Imagery Metadata
MISB	Motion Imagery Standards Board
MISP	Motion Imagery Standards Profile
ST	Standard
UML	Unified Modelling Language

5 Introduction

The Motion Imagery MetaData (MIMD) Model [1] provides a comprehensive structure of classes and attributes to support various objectives in Motion Imagery exploitation. The MIMD Model is a UML model organized as a hierarchy of information including metadata for temporal, platform, payload, sensor, command, automated processes, exploitation, security, and more. The design of the model allows the use of a subset classes that achieve mission specific objectives. In this way, a minimal number of MIMD classes and attributes meets application needs while optimizing the bandwidth needed to convey the information.

This standard defines three profiles tailored to surface applications: Mission Support, Situational Awareness, and Targeting Support.

- The *Mission Support Surface Profile* provides basic information on the identity, location, and scene information.
- The *Situational Awareness Surface Profile* supports the tracking of objects in a scene.
- The *Targeting Support Surface Profile* provides information to support targeting.

Construction of the profiles is hierarchical where each successive profile introduces additional functionality and complexity.

6 Profiles

The MIMD Model is a hierarchal UML model of classes with each class containing attributes. Each surface profile specifies required classes and elements from the MIMD Model. A "path" provides a method for denoting specific classes and attributes from the model hierarchy. This document uses a "dot" (period) notation in the path when referencing classes and attributes. A period separates the class names and attribute names when defining a path to a class or attribute. For example, the path for specifying the attribute *airTemperature* from the Atmosphere class is: **MIMD.Platform.Atmosphere.airTemperature.**

To distinguish the final element in the path (i.e., class or attribute), the model requires all classes begin with a capital letter and all attributes begin with a lower-case letter. Note the above example where MIMD, Platform and Atmosphere are all classes (i.e., capitalized) while airTemperature is an attribute (i.e., lowercase). When the last element of the path is a class itself, then either: 1) all attributes from all classes in the path are required, or 2) a *Note* will describe what the requirements are.

Certain model attributes are a list of other classes; two symbols provide a means to indicate all elements or one element in the list:

- A parenthesized star (*) denotes all elements in the list must include the classes and attributes that follow. For example, **MIMD.Platform(*).identity** means all platforms in the list need to include the identity attribute.
- A parenthesized hash (#) indicates a single item of the list. For example, **MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics.Distortions(#)** means at least one item in the Distortions list needs to be specified in the profile.

The Sections below define the requirements for each profile using "paths." The MIMD Model defines the attribute's data types, ranges, and other information (including attribute and class requirements). Each profile contains a table of classes and attributes to meet the requirements of the profile. Each table's first column is the path to the required class or attribute (discussed above). The second column is the reference MISB standard defining the class or attribute. The third column provides references to Notes below the table which may include specific requirements. Finally, the MIMD Model enforces the Report on Change methodology to conserve bandwidth. See the Motion Imagery Handbook [2] about Report on Change.

6.1 Mission Support Surface Profile

The *Mission Support Surface Profile* provides a minimal set of metadata to support functions such as video cameras for safety and security, dissemination, general surveillance, weapon safety, security, etc. Table 1 lists the classes and attributes to meet the requirements of the Mission Support Surface Profile.

Requirement	
ST 1801-01	A Mission Support Surface Profile conformant MIMD stream shall contain the items listed in ST 1801 Table 1: Mission Support Surface Profile.

Table 1: Mission Support Surface Profile

Path to Required Classes and Attributes	MISB ST	Note
MIMD.versionNumber	1903 [1]	
MIMD.compositeProductSecurityId	1903	
MIMD.Timer.nanoPrecisionTimeStamp	1903	
MIMD.Timer.utcLeapSeconds	1903	
MIMD.Security.classificationMethod	1903	
MIMD.Security.classification	1903	
MIMD.Platform(*).identity	1905 [3]	
MIMD.Platform(*).Stage	1905	Note 1
MIMD.Platform(*).Payload(*).GeoIntelligence(*).Stage	1907 [4]	Note 1
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.name	1908 [5]	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.FieldOfView.horizontalFieldOfView	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.FieldOfView.verticalFieldOfView	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.MIIS	1908	Note 2

Note 1: At a minimum, define a single stage (see MISB ST 1906 [6]) with an absolute position and orientation.

Requirement(s)	
ST 1801-02	Each Platform class instance of a Mission Support Surface Profile conformant MIMD stream shall contain a minimum of a single Stage class instance with an absolute position and orientation.
ST 1801-03	Each GeoIntelligence class instance of a Mission Support Surface Profile conformant MIMD stream shall contain a minimum of a single Stage class instance with an absolute position and orientation.

Note 2: Define either a FoundationalCoreId or MinorCoreId. The MISB highly recommends Foundational Core Identifiers over Minor Core Identifiers. For system developers failing to provide a Foundational Core Identifier, a Minor Core Identifier will suffice. MISB ST 1204 [7] defines required identifiers and their placement in a Motion Imagery stream or file.

Requirement	
ST 1801-04	An ImagerySystem class instance of a Mission Support Surface Profile conformant MIMD stream shall provide a FoundationalCoreId or a MinorCoreId attribute in accordance with MISB ST 1204.

6.2 Situational Awareness Surface Profile

The *Situational Awareness Surface Profile* provides a minimal set of metadata to support the functions of navigation, surveillance, intel collection, target tracking, object classification, object identification, and engagement assessment. Note that this profile does not support a weapons fire control loop.

To perform these functions systems will need to have an estimate of distance to an. Some of the Situational Awareness Surface Profile information is conditional and only applies on the detection of an object within the Scene; otherwise, it does not need to be included. The Situational Awareness Surface Profile builds upon the Mission Support Surface Profile. As such, the combined contents of Table 1 and Table 2 lists the classes and attributes to meet the requirements of the Situational Awareness Surface Profile.

Requirement	
ST 1801-05	A Situational Awareness Surface Profile conformant MIMD stream shall contain the items listed in ST 1801 Table 1: Mission Support Surface Profile and the required and conditional items (see item notes) in Table 2: Situational Awareness Surface Profile.

Table 2: Situational Awareness Surface Profile

Path to Required Classes and Attributes	MISB ST	Note
MIMD.Platform(*).Payload(*).GeoIntelligence(*).Correspondance.row	1907	Note 1
MIMD.Platform(*).Payload(*).GeoIntelligence(*).Correspondance.col	1907	Note 1
MIMD.Platform(*).Payload(*).GeoIntelligence(*).Correspondance.Range. rangeDistance	1907	Note 1 Note 2
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics. focalLength	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics. activeDistortion	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics. Distortions(#)	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics. activeTransmission	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Optics. Transmission(#)	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Calibration	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Imager. Sensor.xColumns	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Imager. Sensor.yRows	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Imager. Sensor.xSampleSize	1908	
MIMD.Platform(*).Payload(*).GeoIntelligence(*).ImagerSystem.Imager. Sensor.ySampleSize	1908	

Note 1: When an object of interest is in the Scene, these Correspondance values are set.

Requirement(s)	
ST 1801-06	Where a detected object is in the image, a Mission Support Surface Profile conformant MIMD stream shall include a Correspondence class instance that sets the row and column attributes to the location of the object in the image.
ST 1801-07	Where a detected object is in the image, a Mission Support Surface Profile conformant MIMD stream shall include a Range class instance that sets the rangeDistance to the object in the scene.

Note 2: Sources such as sensor data/metadata, computationally derived parameters, or an LRF may provide rangeDistance information.

6.3 Targeting Support Surface Profile

The Targeting Support Surface Profile provides metadata to support targeting of scene objects. The Target Support Surface Profile extends the Situational Awareness Surface Profile by including uncertainty information for the positioning information.

The Targeting Support Surface Profile builds upon the Situational Awareness Surface Profile. The contents of Table 1, Table 2 and Table 3 lists the classes and attributes to meet the requirements of the Targeting Support Surface Profile.

Requirement	
ST 1801-08	A Targeting Support Surface Profile conformant MIMD stream shall contain the items listed in three ST 1801 tables Table 1: Mission Support Surface Profile, Table 2: Situational Awareness Surface Profile and Table 3: Target Support Surface Profile.

Table 3: Target Support Surface Profile

Path to Required Classes and Attributes	MISB ST	Note
MIMD.Platform(*).Stage(*).StdDevAndCorrelation	1905/1904 [8]	Note 1
MIMD.Platform(*).Payload(*).GeoIntelligence(*).Stage(*). StdDevAndCorrelation	1907/1904	Note 1

Note 1: These items are the position and rotational uncertainty information for all stages.